

Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-15 and 17-30 are pending in the application, with claims 1, 10, 15, 17, and 26 being the independent claims. Claim 16 is sought to be cancelled herein without prejudice to or disclaimer of the subject matter therein. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Claim Objections

Claims 1-9 and 17-25 are objected to for minor informalities. Claims 1, 2, 17, and 19 are amended herein as suggested by the Examiner. Accordingly, Applicant respectfully requests that the objections to the claims be withdrawn.

Rejections under 35 U.S.C. § 112

Claims 5-9 and 17-30 are rejected under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite.

The Examiner considered the recitation of "an estimate of the second transmission" to be unclear. Claim 5 is amended herein as suggested by the Examiner to recite "an updated estimate of the second transmission." Accordingly, Applicant

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respectfully requests the rejection of claim 5, and claims 6-9 which depend therefrom, be withdrawn.

The Examiner also considered claims 17 and 26 to be unclear because they recite an apparatus in the preamble but only recite method steps in the body. Claims 17 and 26 are amended herein to recite structural elements in the body of claims 17 and 26 to clarify they are apparatus claims. Accordingly, Applicant respectfully requests that the rejection of claims 17 and 26, and claims 18-25 and 27-30 which depend therefrom, respectively, be withdrawn.

Rejections under 35 U.S.C. § 101

Claims 15 and 16 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter of a computer program. Claim 15 is amended herein to recite a computer program product, which is believed to be statutory subject matter. Claim 16 is cancelled herein. Accordingly, Applicant respectfully requests that the rejection of claim 15 be withdrawn.

Rejections under 35 U.S.C. § 103

Claim 1-3, 5-12, 14-19, 21-28, and 30 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent No. 7,321,581 to Wei *et al.* ("the Wei patent") in view of U.S. Pub. No. 2003/0095590 to Fuller *et al.* ("the Fuller publication"). Dependent claims 4, 13, 20, and 29 are rejected as being unpatentable over the Wei patent in view of the Fuller publication and further in view of additional references. Applicant respectfully traverses these rejections as the Wei patent and the

Fuller publication, either alone or in combination, fail to disclose or render obvious the claimed invention.

The claimed inventions are directed to a method, apparatus, and computer program product for estimating the timing of individual transmissions received as a combined signal. In particular, independent claim 1 recites:

A method of estimating a timing of a first transmission received with a second transmission as a combined signal over a multiple access interference channel, comprising:

- a. estimating a timing of the second transmission;
- b. demodulating, decoding and remodulating the second transmission, on the basis of the estimated timing of the second transmission, to generate an estimate of the second transmission;
- c. cancelling the estimate of the second transmission from the combined signal to generate an estimate of the first transmission; and
- d. estimating the timing of the first transmission from the estimate of the first transmission.

(Emphasis added)

Similarly, independent claim 10 recites:

A method of estimating the timings of a plurality of transmissions received as a combined signal over a multiple access channel, comprising:

- a. estimating the timings of each of the plurality of transmissions;
- b. soft demodulating, soft decoding and soft remodulating current estimates of each of the plurality of transmissions, on the basis of their respective estimated timings, to generate soft estimates of each of the transmissions;
- c. updating the current estimates of each of the transmissions by cancelling the soft estimates of the other transmissions from the combined signal;
- d. estimating the timings of each of the transmissions from the respective current estimates of the transmissions; and
- e. repeating steps b to d to obtain progressive estimates of the timings of each of the transmissions.

(Emphasis added)

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Independent claim 15, as amended herein, is directed to "a computer program product embodied on a computer useable medium comprising computer readable program code for performing the method of claim 10." Independent claim 17, as amended herein, is directed to

An apparatus for estimating a timing of a first transmission received with a second transmission as a combined signal over a multiple access interference channel, the apparatus comprising:

a detector to estimate the timing of the second transmission;

a demodulator configured to demodulate the second transmission, on the basis of the estimated timing of the second transmission;

a decoder configured to decode the demodulated second transmission;

a modulator configured to remodulate the decoded second transmission to generate an estimate of the second transmission;

the detector configured to cancel the estimate of the second transmission from the combined signal to generate an estimate of the first transmission; and

an acquisition function configured to estimate the timing of the first transmission from the estimate of the first transmission.
(Emphasis added)

Similarly, independent claim 26, as amended herein, is directed to

An apparatus for estimating the timings of a plurality of transmissions received as a combined signal over a multiple access channel, the apparatus comprising:

a detector configured to estimate the timings of each of the plurality of transmissions;

a demodulator configured to soft demodulate current estimates of each of the plurality of transmissions, on the basis of their respective estimated timings;

a decoder configured to soft decode the soft demodulated transmissions;

a modulator configured to soft remodulate the soft decoded transmissions to generate soft estimates of each of the transmissions;

the detector configured to update the current estimates of each of the transmissions by cancelling the soft estimates of the other transmissions from the combined signal; and

an acquisition function configured to estimate the timings of each of the transmissions from the respective current estimates of the transmissions;

wherein the apparatus is configured to obtain progressive estimates of the timings of each of the transmissions.

(Emphasis added)

The Wei patent appears to be directed to double weighting parallel interference cancellation in a CDMA system wherein a RAKE receiver takes into account multipath fading relying on time delays between the signal components. See col. 4, lines 23-54. However, the time delays, or relative timings, between the signal components disclosed in the Wei patent are not the estimated timings of the transmissions, as claimed. While the RAKE receiver disclosed in the Wei patent appears to make channel estimations (see Fig. 2), which the Examiner has taken to be the claimed timing estimates, the channel estimations are estimates of the channel of the transmission, not estimates of the timing of the transmission. Accordingly, the Wei patent fails to disclose, or provide a reason or rationale for, estimating the timings of a transmission, or a detector or an estimated multiple access channel for estimating the timings of a transmission, as claimed.

The Fuller publication fails to cure the deficiencies of the Wei patent. The Fuller publication appears to be directed to an interference cancellation technique, that also determines channel estimates (see Fig. 2), not timing estimates of the transmissions. The Fuller publication fails to disclose, or provide a reason or rationale for, estimating the timings of a transmission, or a detector or an estimated multiple access channel for estimating the timings of a transmission, as claimed. Further, the Fuller publication provides no rationale to modify the disclosure of the Wei patent to include such features. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness.

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For at least the reasons noted above, independent claims 1, 10, 15, 17, and 26 are allowable. Further claims 2-9, which depend from independent claim 1; claims 11-14, which depend from independent claim 10; claims 18-25, which depend from independent claim 17; and claims 27-30, which depend from independent claim 26 are allowable for the same reasons as their respective independent claim. Accordingly, Applicant respectfully requests that the rejections be reconsidered and withdrawn, and the claims allowed.

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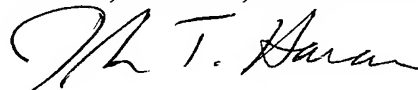
Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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